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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,294	12/20/2001	Michael David Church	INT-0001A	8108

7590 12/13/2002
Richard K. Robinson
Suite 575
North Dallas Bank Tower
12900 Preston Road, LB-41
Dallas, TX 75230

EXAMINER

NGUYEN, KHIEM D

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 12/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/026,294

Examiner

Khiem D Nguyen

Applicant(s)

CHURCH, MICHAEL DAVID

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 September 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in combination with Houston (U.S. Patent No. 6,261,866), Maurelli et al (U.S. Patent No. 5,479,367) and Yamane et al (U.S. Patent No. 6,337,249).

Applicant's admitted prior art (AAPA) discloses in figures 2 and 3 and related text a method of making a semiconductor device comprising the steps of performing a LOCOS operation on an epitaxial layer of a pre-doped N-type semiconductor substrate to define an active region have a predefined boundary (figure 3); implanting a first dopant into the epitaxial layer within the active region to create a well of first type conductivity (figure 3, 6); depositing a polysilicon layer over the active region, doping the polysilicon layer to create a poly semiconductor layer of a second type of conductivity, patterning the poly semiconductor layer to create a poly gate (figure 3, 1) over the first region and well; performing an ion implant of the second type conductivity between the LOCOS regions and the poly gate to create first and second lightly doped regions (figure 3, 5 and 15), the first and second lightly doped regions being separated by a channel region beneath the poly gate, depositing an oxide layer over the poly gate and active regions, etching the

oxide layer to create side spacers (figure 3, 7 and 17) on each side of the poly gate and implanting a heavy dose of the second type of dopant between the LOCOS regions and the side spacers to create source and drain regions (figure 3, 4 and 14), the source and drain regions being separated by the channel region. AAPA further discloses that the first type of dopant is a P type dopant and the second type of dopant is an N type dopant (Specification, p. 8, second paragraph).

AAPA fails to expressly disclose a step of implanting the first dopant into the well to create at least a first region, and also fails to teach the use of masks during the heavy dose, light dose and first region implantation steps.

Maurelli et al disclose in figures 1-3 and related text a method of implanting the first dopant into the well to create at least a first region (figure 5, 4) and discloses using a photoresist (figure 5 and 6, 3 and 5) mask during the creation of the N⁺ region (figure 6, 9) and first region (figure 5). Maurelli further discloses implanting the N type dopant so that the lightly doped region is not in contact with the first region (figure 3). It would have been obvious to combine the teaching of Maurelli with the method of AAPA in order to guarantee a very good performance in terms of writing speed and current absorption (col. 2, lines 8-16)

Neither AAPA nor Maurelli disclose implanting the N type dopant so that the lightly doped regions are in contact with the first region. Yamane et al disclose in figures 1-15D and related text a method implanting the N type dopant so that the lightly doped regions (figure 2D, 15b) are in contact with the first region (figure 2D, 17). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the

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teaching of Yamane with the combined method of AAPA and Maurelli in order to establish a threshold voltage at a desired value (col. 7, lines 20-55).

Finally, none of the cited prior art teaches implanting the first and second region so that the two regions are separated and below the poly gate with an active region between the first and second region. Houston et al disclose in figures 1-3c a method of implanting the first and second region so that the two regions are separated and below the poly gate with an active region between the first and second region (figures 2b and 2c). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teaching of Houston with the combined method of AAPA, Maurelli and Yamane in order to provide continued capacitive coupling of the gate to the body for a greater range of the gate voltage (col. 5, lines 30-35).

Response to Amendment

Response to Applicant's Arguments

Applicant's arguments filed 9-23-2002 have been fully considered but they are not persuasive.

In response to Applicant's argument that the AAPA and Maurelli references are not combinable because AAPA discloses making the N⁺ implant for the source and drain regions 4 and 14 between the side wall spacers and the LOCOS on top of the lightly doped regions 5 and 15. Whereas Maurelli teaches implanting the source and drain regions 7 and 8 prior to implanting the lightly doped regions 16 and 17.

However, Examiner only relied on the Maurelli reference as a secondary reference to teach implanting the first dopant into the well to create at least a first region

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(figure 5, 4) and using a photoresist (figure 5 and 6, 3 and 5) mask during the creation of the N⁺ region (figure 6, 9) and first region (figure 5) in which AAPA fails to disclose.

Applicant further stated that the emphasized limitation as taught by Yamane et al. in (col. 7, lines 20-55) is contrary to the teaching of applicant's invention.

Examiner disagreed. Yamane teaches implanting the N type dopant so that the slightly doped regions (figure 2D, 15b) are in contact with the first region (figure 2D, 17).

Applicant's argument regarding on the Houston reference have been fully considered but they are not persuasive. Houston et al. disclose in (figures 2b and 2c) a method of implanting the first and second region so that the two regions are separated and below the poly gate with an active region between the first and second region. Thus, Houston et al. teaches the missing limitation as recited in present claim 1.

Conclusion

1. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (703) 306-0210. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chaudhuri Olik can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-9179 for regular communications and (703) 746-9179 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.
December 5, 2002


Khiem D Nguyen
Examiner
Supervisor: Chaudhuri Olik
Technology Center 2823